Methodology of Development of Energy Strategies

1.1. General on LTDH implementation strategy General Function

- Temperature lowering in heating network is complex process involving heat production, distribution, and heat consumer.
- Long-term planning is necessary to align all the system elements to lower heat carrier temperatures. Strategy helps to long-term planning for future DH system development
- The implementation strategy is as useful document, which puts the building modernization and infrastructure redevelopment into a meaningful order.

1.2. Main steps for strategy implementation

The main steps for development of LTDH implementation strategy are:

- Analyses of preconditions
- Stakeholder analyses
- Institutional and organizational framework
- Analyses of strategy pathway for transformation
- Initial district identification
- Data collection and scenario evaluation
- SWOT analyses
- Evaluation of implementation conditions and synergies
- Reflection and learning

Within the implementation of the DH development strategy towards LTDH system it is crucial to analyse different heating supply system parameters. The whole city or region should be thus investigated by taking account regional differences and key needs. Therefore, this overview should allow identifying the aspects that has not been strengthened yet and would affect the focus of the transformation process.

The transformation path and relevant technological solutions will depend on the several aspects:

- building heat requirements.
- desirable heating network temperature level.
- heat source
- heat generation technology etc

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OVERVIEW OF TRANSFORMATION PATHS FOR DIFFERENT TYPES OF BUILDINGS

Building area type	Flow temperature	Technical solutions for heat delivery	Favourable energy sources	Conversion technology	Adjustments for SH	Adjustments for DHW
Existing building area with HTHS	>70°C	Temperature optimisation Adjusted heat exchangers	Biomass Biogas Fossil fuels	CHP Heating boiler	Existing high temperature radiators	No necessary
Existing building area with adjusted LTHS	60-70°C	+ Energy cascades Use of return flow for heat supply	High potential waste heat Solar energy Biomass Biogas Combined energy sources Fossil fuels	CHP Heating boiler Solar collectors	Adjusted low temperature radiators or under-floor heating Adjusted heat exchangers in substation	
Mixed building area or renovated building area with HTHS					Existing high temperature radiators	
Newly build and renovated building area with adjusted HS	<60 °C	Use of plastic heating network pipes Use of direct connection for space heating Increased pressure in heating network Adjusted heat substations Short-circuit flows Proper by-pass design	Low potential waste heat; Environmental heat (geothermal field, large bodies of water, pits. soil, water, air); Solar energy RES renewable electricity Biogas Synth. methane Hydrogen Biomass	Heat pump Power-to-heat Solar collectors Condensing system technologies CHP	Under-floor heating Low temperature radiators Forced air heating systems	Proper design of in-house DHW preparation and distribution systems Low-temperature water treatment

Conclusion

- Development of long-term strategy is crucial for successful implementation of low temperature district heating;
- Analyses of preconditions allows to identify most suitable future transformation pathway for particular DH system;
- More detailed technical analyses is necessary for particular district to compare different technical alternatives regarding energy source, heat distribution and energy consumption;
- SWOT analyses can be carried out to evaluate main strengths, weaknesses, opportunities and threats for each analyzed LTDH alternative solutions;
- It is important to monitor the main indicators of implemented pilot cases (fuel and energy consumption, heat losses, heat production efficiency etc.) to drive conclusions for future projects.

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